

EXHIBIT 3

(Claims Chart U.S. Patent 7,568,502)

Patent Infringement Review of Faster Coupling

US Patent 7,568,502



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(12) **United States Patent**
Marquis

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(54) **COUPLING FOR A HYDRAULIC OR PNEUMATIC ASSEMBLY**

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(*) **Notice:** Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 386 days.

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(51) **Int. Cl.** **F16L 57/28** (2006.01)

(52) **U.S. Cl.** **137/614.06, 137/614.04, 137/614.05, 137/614.07, 137/614.08, 137/614.09, 137/614.10, 137/614.11, 137/614.12, 137/614.13, 137/614.14, 137/614.15, 137/614.16, 137/614.17, 137/614.18, 137/614.19, 137/614.20, 137/614.21, 137/614.22, 137/614.23, 137/614.24, 137/614.25, 137/614.26, 137/614.27, 137/614.28, 137/614.29, 137/614.30, 137/614.31, 137/614.32, 137/614.33, 137/614.34, 137/614.35, 137/614.36, 137/614.37, 137/614.38, 137/614.39, 137/614.40, 137/614.41, 137/614.42, 137/614.43, 137/614.44, 137/614.45, 137/614.46, 137/614.47, 137/614.48, 137/614.49, 137/614.50, 137/614.51, 137/614.52, 137/614.53, 137/614.54, 137/614.55, 137/614.56, 137/614.57, 137/614.58, 137/614.59, 137/614.60, 137/614.61, 137/614.62, 137/614.63, 137/614.64, 137/614.65, 137/614.66, 137/614.67, 137/614.68, 137/614.69, 137/614.70, 137/614.71, 137/614.72, 137/614.73, 137/614.74, 137/614.75, 137/614.76, 137/614.77, 137/614.78, 137/614.79, 137/614.80, 137/614.81, 137/614.82, 137/614.83, 137/614.84, 137/614.85, 137/614.86, 137/614.87, 137/614.88, 137/614.89, 137/614.90, 137/614.91, 137/614.92, 137/614.93, 137/614.94, 137/614.95, 137/614.96, 137/614.97, 137/614.98, 137/614.99, 137/615.00**

(58) **Field of Classification Search** **137/614.04, 137/614.05, 137/614.06, 137/614.11, 137/614.12, 137/614.13, 137/614.14, 137/614.15, 137/614.16, 137/614.17, 137/614.18, 137/614.19, 137/614.20, 137/614.21, 137/614.22, 137/614.23, 137/614.24, 137/614.25, 137/614.26, 137/614.27, 137/614.28, 137/614.29, 137/614.30, 137/614.31, 137/614.32, 137/614.33, 137/614.34, 137/614.35, 137/614.36, 137/614.37, 137/614.38, 137/614.39, 137/614.40, 137/614.41, 137/614.42, 137/614.43, 137/614.44, 137/614.45, 137/614.46, 137/614.47, 137/614.48, 137/614.49, 137/614.50, 137/614.51, 137/614.52, 137/614.53, 137/614.54, 137/614.55, 137/614.56, 137/614.57, 137/614.58, 137/614.59, 137/614.60, 137/614.61, 137/614.62, 137/614.63, 137/614.64, 137/614.65, 137/614.66, 137/614.67, 137/614.68, 137/614.69, 137/614.70, 137/614.71, 137/614.72, 137/614.73, 137/614.74, 137/614.75, 137/614.76, 137/614.77, 137/614.78, 137/614.79, 137/614.80, 137/614.81, 137/614.82, 137/614.83, 137/614.84, 137/614.85, 137/614.86, 137/614.87, 137/614.88, 137/614.89, 137/614.90, 137/614.91, 137/614.92, 137/614.93, 137/614.94, 137/614.95, 137/614.96, 137/614.97, 137/614.98, 137/614.99, 137/615.00**
See application file for complete search history.

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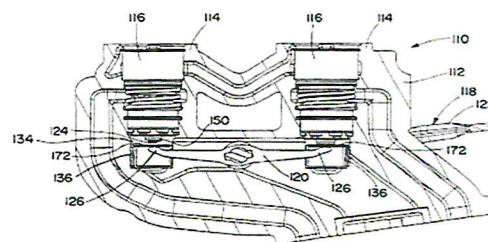
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(57) **ABSTRACT**

A coupling (110) comprising a pair of female couplers (116) each independently movable within a respective housing bore (114) among an operating position, a release position, and a coupling position. When a female coupler (116) is moved to the coupling position, a stop member (136) moves the plunger of a pressure relief valve (124) to an open position to allow fluid to be released from the female coupler (116) prior to coupling a male coupler thereto. A cam member (126), which is used to move the respective female coupler (116) from the operating position to the release position, can move away from the plunger when the female coupler (116) is in the coupling position as the pressure relief valve (124) is held open by the stop member (136).

15 Claims, 8 Drawing Sheets



September 16, 2022



CLAIM 1

1. A coupling for a hydraulic or pneumatic assembly comprising:
a housing having a bore;
a female coupler movable within the bore between
 an operating position whereat, when a male coupler is coupled thereto, the male coupler is retained in the female coupler,
 a release position whereat the male coupler can be released from the female coupler, and
 a coupling position whereat the male coupler can be coupled to the female coupler;
a pressure relief valve that includes **a plunger** movable from **a closed position** to **an open position** respectively blocking and permitting release of pressurized fluid from **a flow passage** inside the female coupler;
a cam member movable to initially move the valve plunger from its closed position to its open position and then to move the female coupler from its operating position to its release position, thereby allowing the pressure relief valve to release pressurized fluid from the flow passage of the female coupler prior to removal of the male coupler; and
a stop member for moving the plunger from its closed position to its open position when the female coupler is moved to its coupling position, thereby allowing the pressure relief valve to release pressurized fluid from the flow passage of the female coupler prior to coupling of the male coupler;
wherein the cam member can move away from the plunger when the female coupler is in its coupling position and the plunger is held in its open position by the stop member.



a housing having a bore



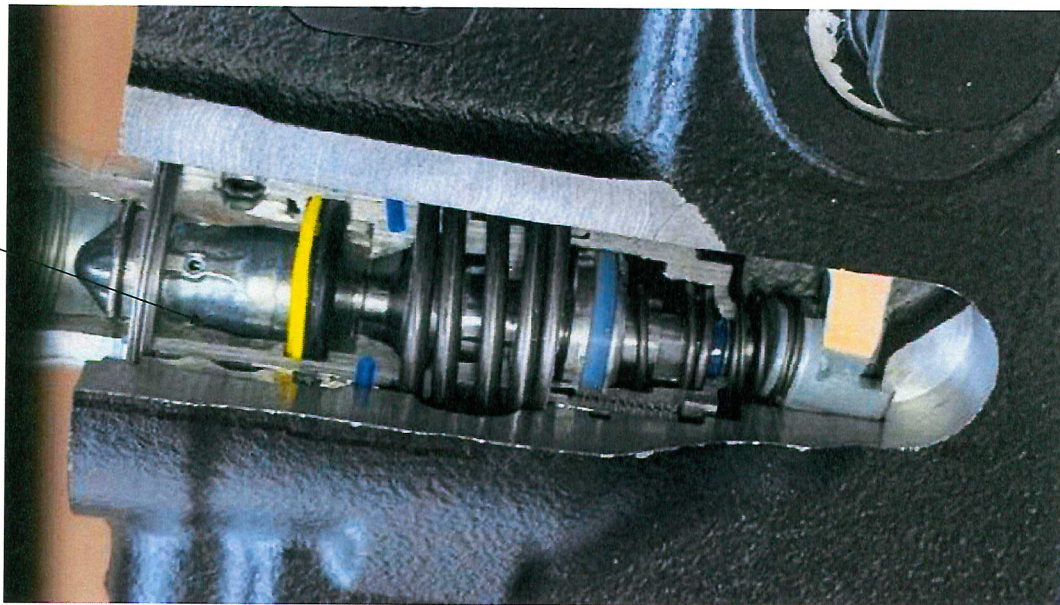
a female coupler movable within the bore

**Female
Coupler**



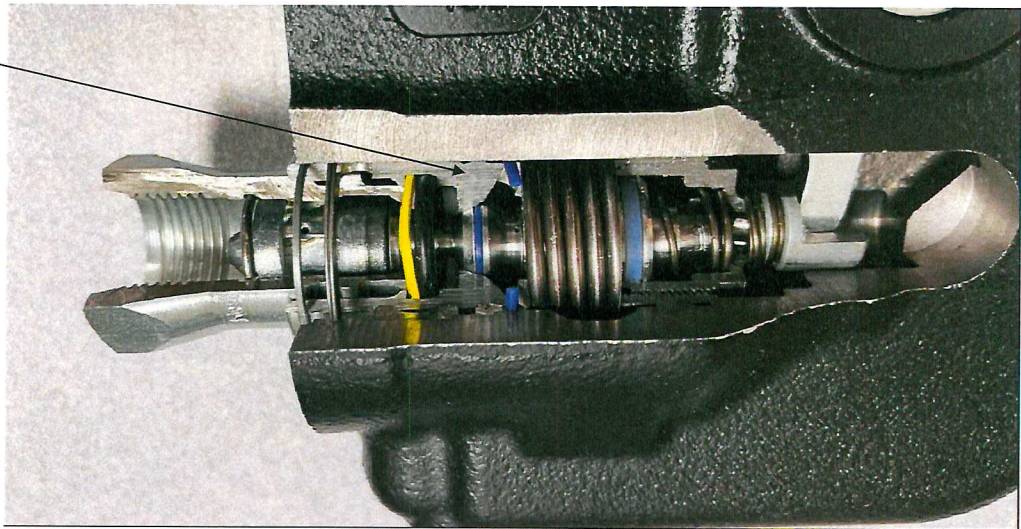
an operating position whereat, when a male coupler is coupled thereto, the male coupler is retained in the female coupler,

**Operating
Position**



a release position whereat the male coupler can be released from the female coupler

**Release
Position**



a coupling position whereat the male coupler can be coupled to the female coupler;

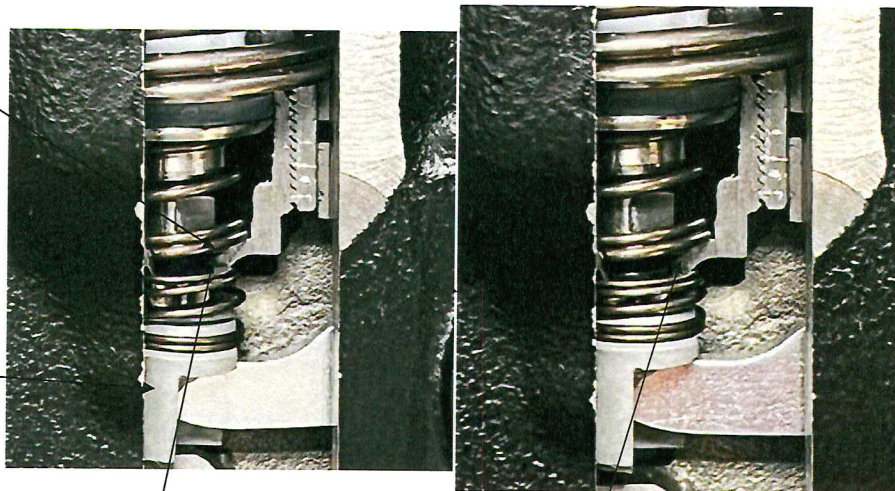
**Coupling
Position**



a pressure relief valve that includes a plunger movable from a closed position to an open position respectively blocking and permitting release of pressurized fluid from a flow passage inside the female coupler;

Pressure Relief Valve

The stop has been machined to expose the inside of the slot feature.

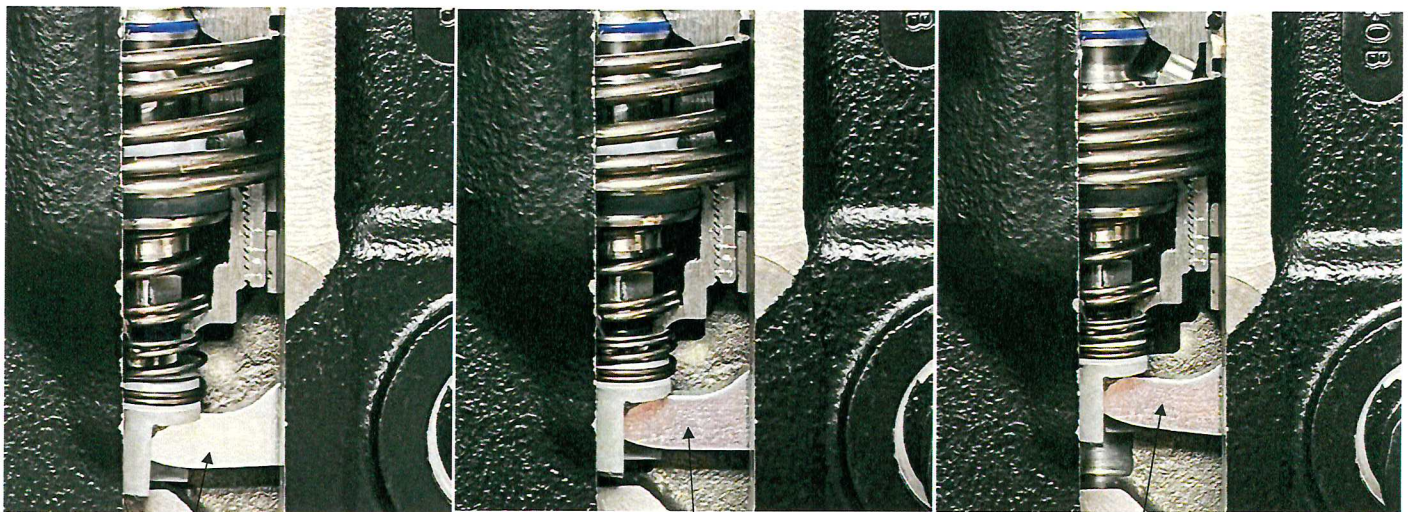


**Closed
Position**

**Open
Position**



a cam member movable to initially move the valve plunger from its closed position to its open position and then to move the female coupler from its operating position to its release position, thereby allowing the pressure relief valve to release pressurized fluid from the flow passage of the female coupler prior to removal of the male coupler



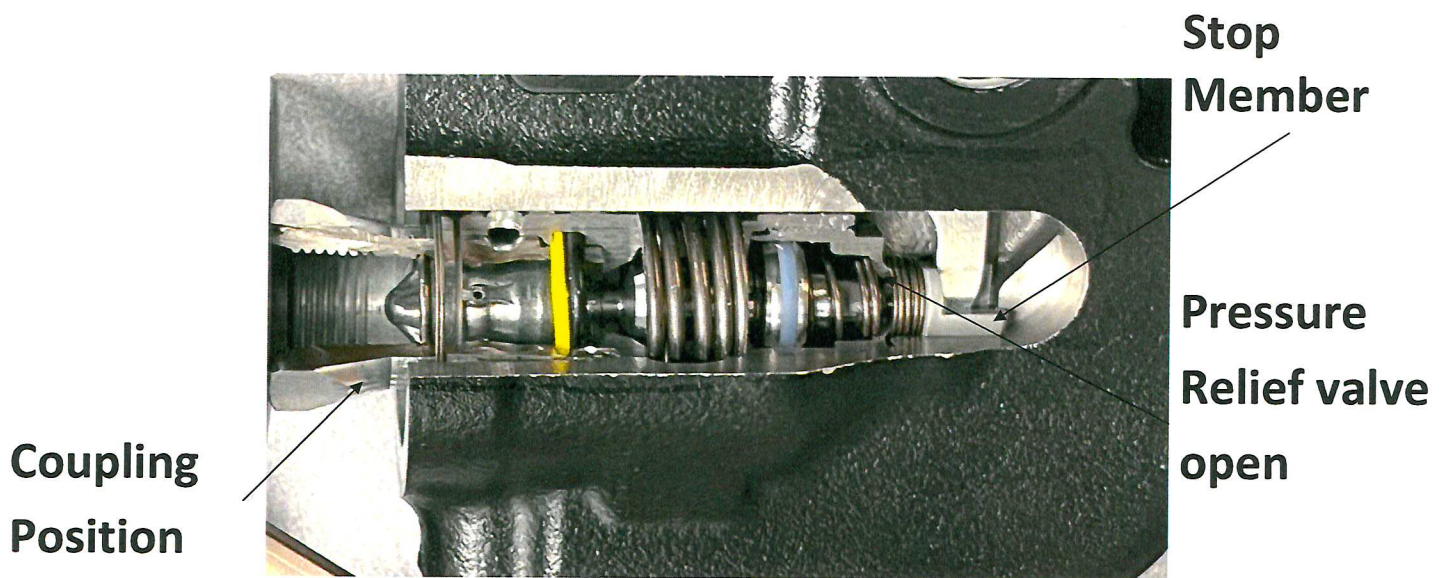
Cam
Member movable.
Plunger closed

Cam
Member moved
Plunger open

Cam
Member moved
Release position



a stop member for moving the plunger from its closed position to its open position when the female coupler is moved to its coupling position, thereby allowing the pressure relief valve to release pressurized fluid from the flow passage of the female coupler prior to coupling of the male coupler;



WHEREIN A CAM MEMBER CAN MOVE AWAY FROM A PRESSURE RELIEF VALVE PLUNGER WHEN A FEMALE COUPLER IS IN A COUPLING POSITION AND THE PLUNGER IS HELD IN AN OPEN POSITION BY A STOP MEMBER,



CLAIM 2

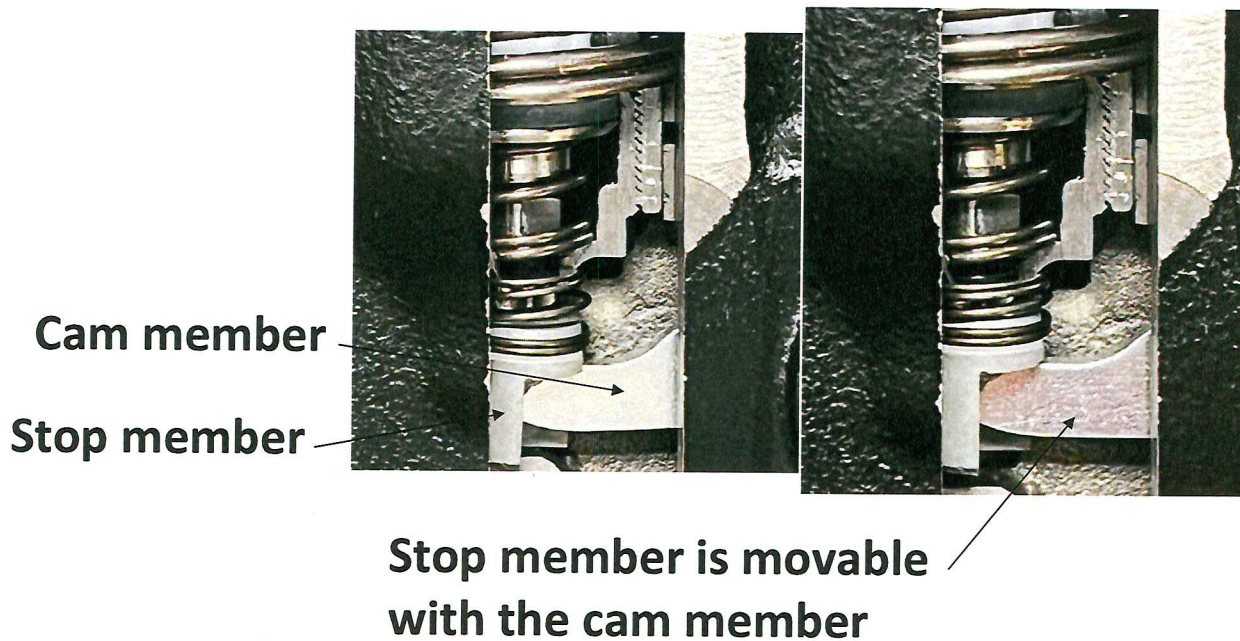
2. A coupler as set forth in claim 1, wherein the stop member is movable relative to the housing.



Stop member is movable relative to the housing

CLAIM 3

3. A coupler as set forth in claim 1, wherein the stop member is movable with the cam member.



CLAIM 4

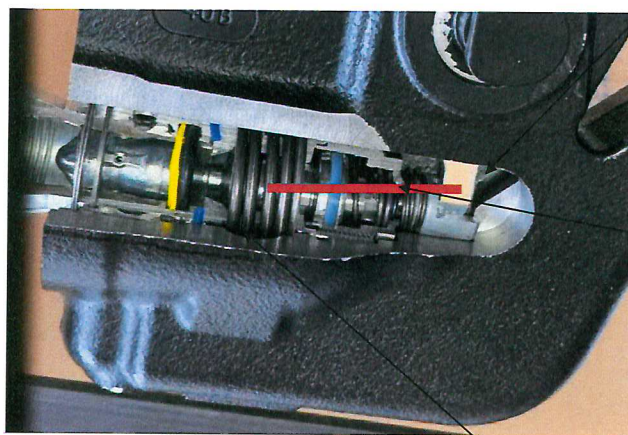
4. A coupler as set forth in claim 1, wherein locking members lock the female coupler to the housing when the female coupler is in the operating position.

Locking members
(items 50 in the 502
patent sheet 2, 3, and
4)



CLAIM 5

5. A coupler as set forth in claim 1, wherein the housing includes a sump chamber and wherein the flow passage in the female coupler communicates with the sump chamber when the plunger is in the open position.



Sump chamber

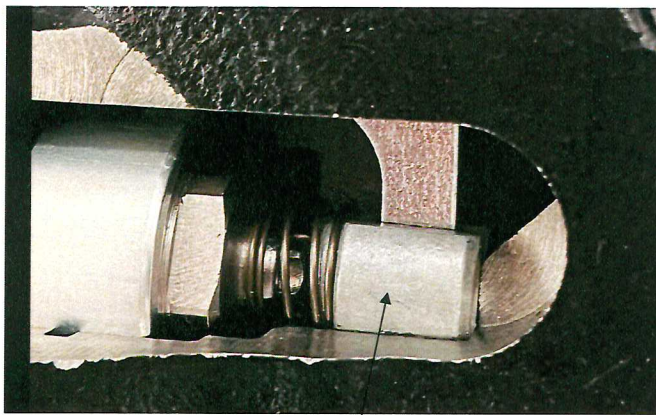
Female coupler communicates with the sump when the plunger is in the open position

Flow passage



CLAIM 6

6. A coupler as set forth in claim 1, wherein the stop member includes a surface which pushes the plunger to the open position and wherein this surface includes an opening for the fluid released from the flow passage in the female coupler to pass therethrough.



Stop member



opening

Stop member includes a surface that pushes the plunger to the open position and this surface includes an opening for the fluid released to pass therethrough

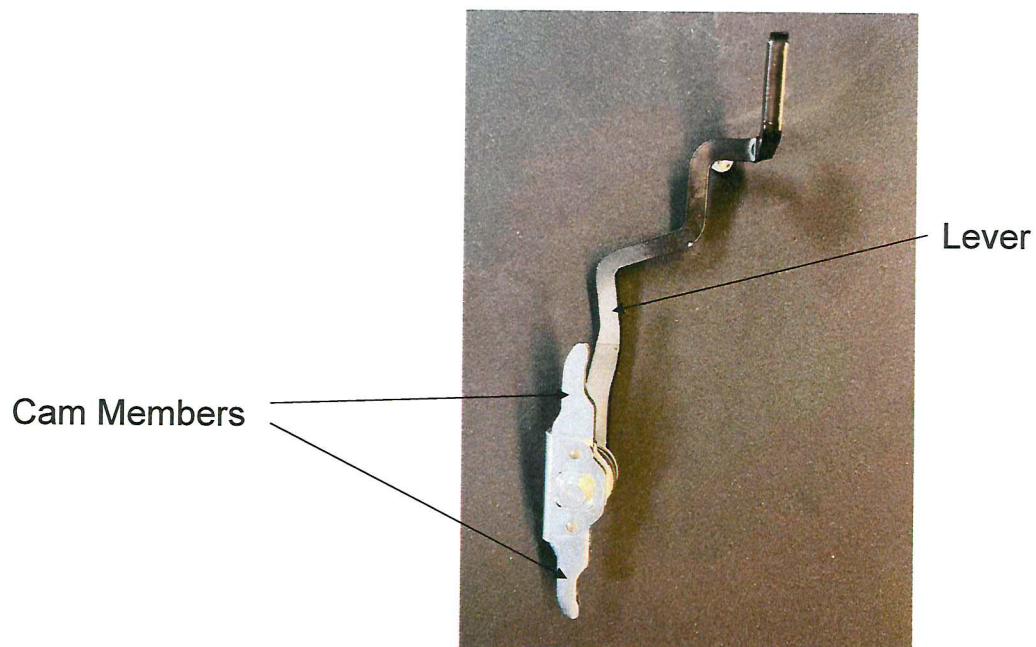
CLAIM 7

7. A coupler as set forth in claim 1, further comprising another bore in the housing, another female coupler, another pressure relief valve, another cam member, and another stop member.



CLAIM 8

8. A coupler as set forth in claim 7, wherein the cam members are movable by a lever.



CLAIM 9

9. A coupler as set forth in claim 7, wherein the lever can only move one female coupler from the operating position to the release position at a time.



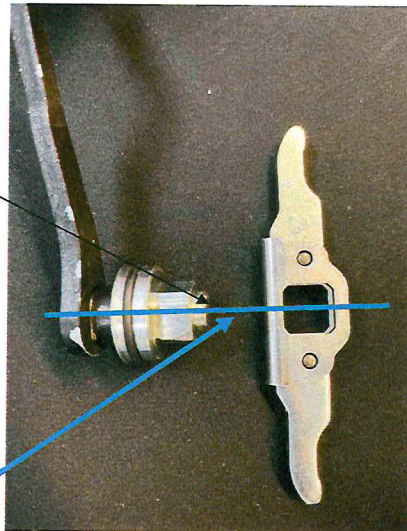
The lever can only turn one of the females from the operating position to the release position due to the folding construction and the way the push/pull action of the lever only activates one coupling at a time.

CLAIM 10

10. A coupler as set forth in claim 7, wherein the lever comprises a rod pivotal about a pivot point and wherein the cam members are carried by the rod on opposite sides of the pivot point.

Rod pivots on a pivot point and the Cam members are carried by the rod

Pivot axis



Cam Members on opposite sides of the pivot point

Pivot point



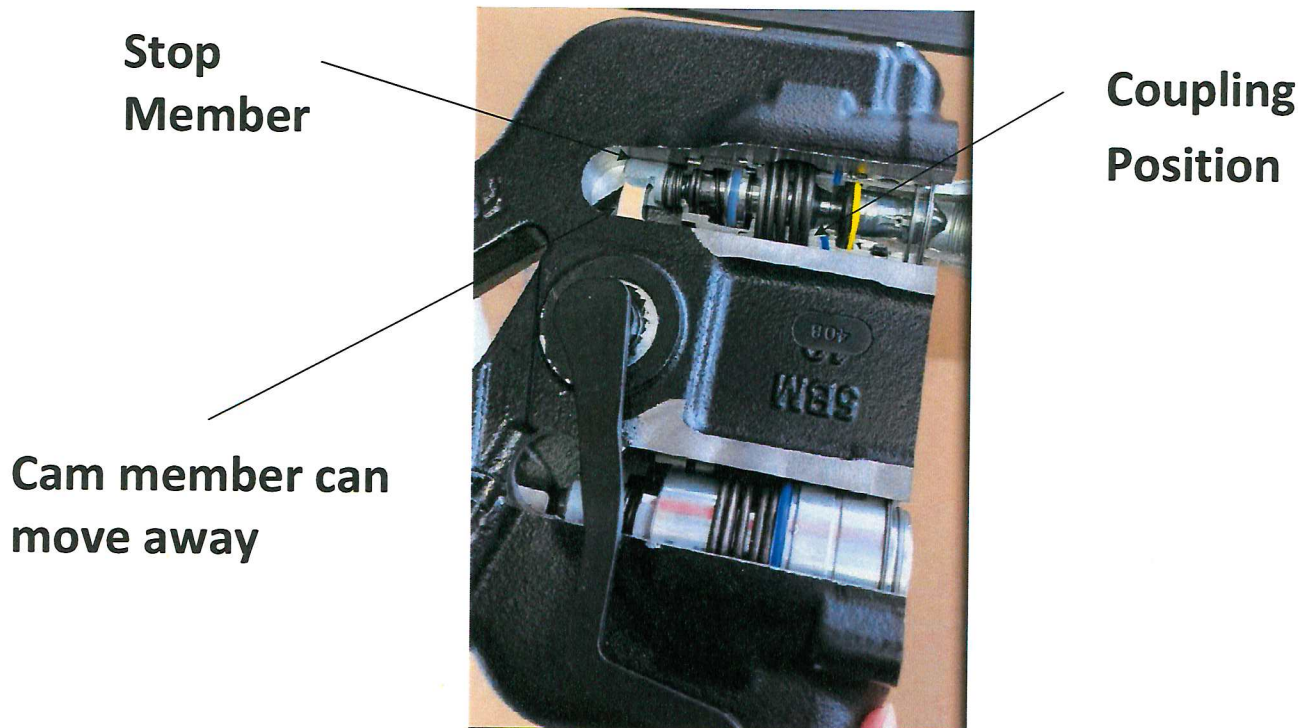
CLAIM 11

11. A female coupler assembly

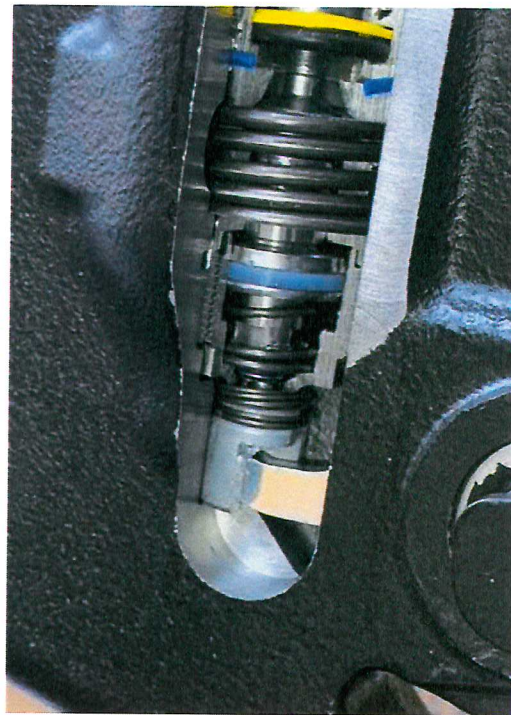
wherein a cam member can move away from a pressure relief valve plunger when a female coupler is in a coupling position and the plunger is held in an open position by a stop member,

wherein the stop member is positioned relative to the plunger so that, regardless of the position of the cam member, the stop member will engage the plunger when the female coupler is in the coupling position.

WHEREIN A CAM MEMBER CAN MOVE AWAY FROM A PRESSURE RELIEF VALVE PLUNGER WHEN A FEMALE COUPLER IS IN A COUPLING POSITION AND THE PLUNGER IS HELD IN AN OPEN POSITION BY A STOP MEMBER,



WHEREIN THE STOP MEMBER IS POSITIONED RELATIVE TO THE PLUNGER SO THAT, REGARDLESS OF THE POSITION OF THE CAM MEMBER, THE STOP MEMBER WILL ENGAGE THE PLUNGER WHEN THE FEMALE COUPLER IS IN THE COUPLING POSITION.



CLAIM 12

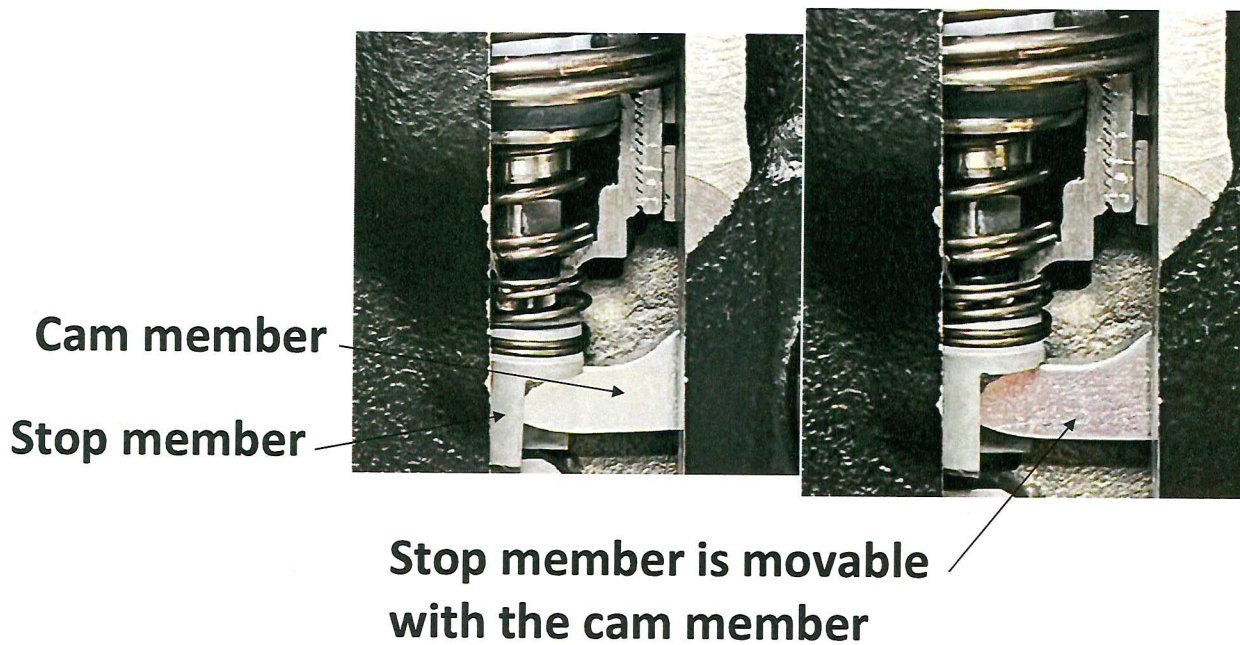
12. A female coupler assembly as set forth in claim 11, wherein the stop member is movable relative to the housing.



Stop member is movable
relative to the housing

CLAIM 13

13. A female coupler assembly as set forth in claim 11, wherein the stop member is movable with the cam member.



CLAIM 14

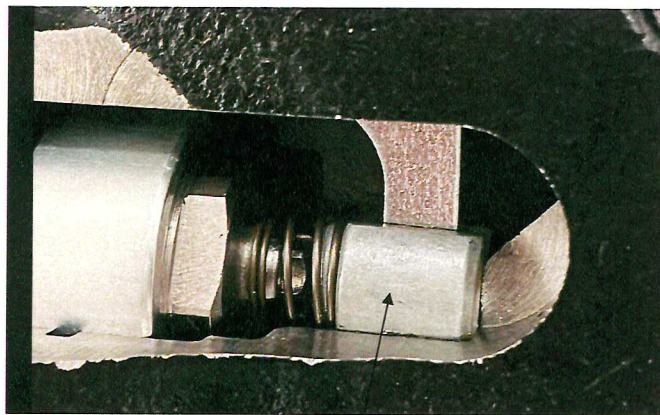
14. A female coupler assembly as set forth in claim 11, wherein locking members lock the female coupler to a housing when the female coupler is in the operating position.

Locking members
(items 50 in the 502
patent sheet 2, 3, and
4)



CLAIM 15

15. A female coupler assembly as set forth in claim 11, wherein the stop member includes a surface which pushes the plunger to the open position and wherein this surface includes an opening for the fluid released from the flow passage in the female coupler to pass therethrough.



Stop member



opening

Stop member includes a surface that pushes the plunger to the open position and this surface includes an opening for the fluid released to pass therethrough